

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An apparatus to determine the shape of a linear array suspended under water comprising a CCD matrix camera with a field-of-view directed along the length of the linear array and a plurality of light sources attached along the linear array that emit light near the attenuation minimum of the water, the light sources being positioned to emit light towards the field-of-view of the camera, the camera having means to obtain an image of each light source individually, the apparatus having means to determine the x and y co-ordinates of an image of a light source, pressure sensors being located on the light sensors and camera, the apparatus having means to determine the difference in depth between a light source and the camera from the pressure sensors, and means to determine the position of each light source on the linear array from said x and y co-ordinates and the difference in depth between a light source and the camera.

2. An apparatus as defined in Claim 1, wherein the light sources are light emitting diodes (LEDs).

3. An apparatus as defined in Claim 2, wherein each light source comprises a plurality of LEDs hermetically sealed in a pressure housing.

4. An apparatus as defined in Claim 3, wherein each light source has a lens located between the LEDs and a window in the housing.

5. An apparatus as defined in Claim 4, wherein the LEDs form a cluster and are canted inwards to the center of the cluster such that each LED's axis passes through the lens's center.

6. An apparatus as defined in Claim 2, wherein the LEDs are Gallium Nitride LEDs.

7. An apparatus as defined in Claim 3, wherein the LEDs are Gallium Nitride LEDs.

8. An apparatus as defined in Claim 4, wherein the LEDs are Gallium Nitride LEDs.

9. An apparatus as defined in Claim 6, wherein the LEDs are Gallium Nitride LEDs.

10. An apparatus as defined in Claim 1, wherein a plurality of cameras are located at different depths such that different portions of the array appear in each camera's field-of-view, each camera after a first camera nearest a surface of the water being positioned such that any one of those cameras can obtain an image of a light source on an adjacent camera.

11. An apparatus as defined in Claim 2, wherein a plurality of LEDs in each light source are mounted in a manner to generate illumination over different angles.

12. An apparatus to determine the shape of an array suspended under water comprising a CCD matrix camera with a field-of-view directed to the array and a plurality of light sources attached to the array at various known locations and which emit light near the attenuation minimum of the water, the light sources being positioned to emit light towards the field-of-view of the camera, the camera having means to obtain an image of each light source individually, the apparatus having means to determine the "x" and "y" co-ordinates of an image of a light source, the apparatus having means to determine the position of each light source from said "x" and "y" co-ordinates and the known locations.

13. An apparatus as defined in Claim 12, wherein the light sources are light emitting diodes (LEDs).

14. An apparatus as defined in Claim 13, wherein each light source comprises a plurality of LEDs hermetically sealed in a pressure housing.

15. An apparatus as defined in Claim 14, wherein each light source has a lens located between the LEDs and a window in the housing.

16. An apparatus as defined in Claim 12, wherein the light sources are Gallium Nitride light emitting diodes (LEDs).

17. An apparatus as defined in Claim 13, wherein the LEDs are Gallium Nitride LEDs.

18. An apparatus as defined in Claim 14, wherein the LEDs are Gallium Nitride LEDs.

19. An apparatus as defined in Claim 15, wherein the LEDs are Gallium Nitride LEDs.

20. An apparatus as defined in Claim 12, wherein a plurality of cameras are located at different depths such that different portions of the array appear in each camera's field-of-view, each camera after a first camera nearest a surface of the water being positioned such that any one of those cameras can obtain an image of a light source on an adjacent camera.